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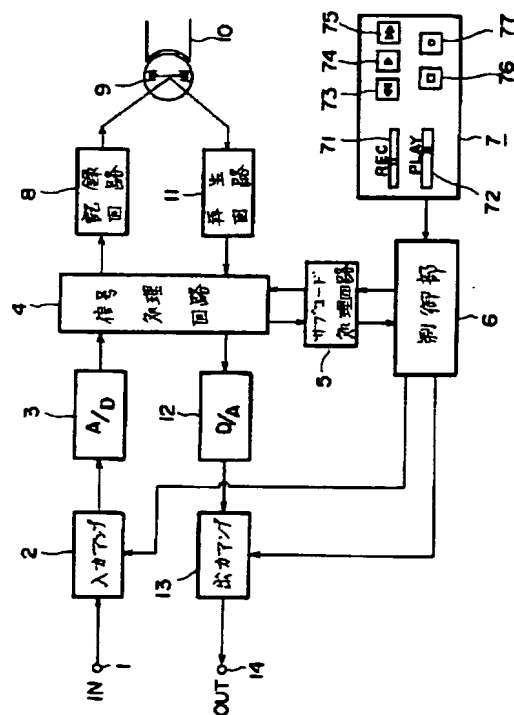
内

(54)【考案の名称】 記録再生レベル制御装置

(57)【要約】

【目的】 録音開始後において、録音レベルを調整し直した場合においても、再生時における再生レベルが変化することのない記録再生レベル制御装置を提供する。

【構成】 入力端子1に供給される音声信号は、キー入力部7における入力レベル調整ボリューム71によって生成されるレベル制御信号によってレベル制御され、信号処理回路4に供給される。レベル制御信号はレベル情報として処理され、記録回路8によって音声入力信号情報と共に、回転ヘッド9によって磁気テープ10に記録される。一方、磁気テープ10から読み出された信号からサブコード信号が分離される。音声信号はD/A変換器12を介して出力アンプ13に供給される。制御部6は記録時のレベルに応じた制御信号を出力アンプ13に供給する。



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【実用新案登録請求の範囲】

【請求項1】 入力信号のレベルを調整する入力レベル調整回路と、

前記入力レベル調整回路によって調整された信号と前記入力レベル調整回路によって調整した入力レベルに関するレベル情報とを同一の記録媒体に対して記録する記録回路と、

前記記録媒体に記録された信号とレベル情報とを読み出して所定レベルに増幅する再生回路と、

前記再生回路によってもたらされる信号を前記再生回路によってもたらされるレベル情報によってレベル調整する出力レベル調整回路とを具備して成る記録再生レベル制御装置。

【図面の簡単な説明】

【図1】 本考案の記録再生レベル制御装置をR-DATに適用した場合の一実施例の構成を示すブロック図である。

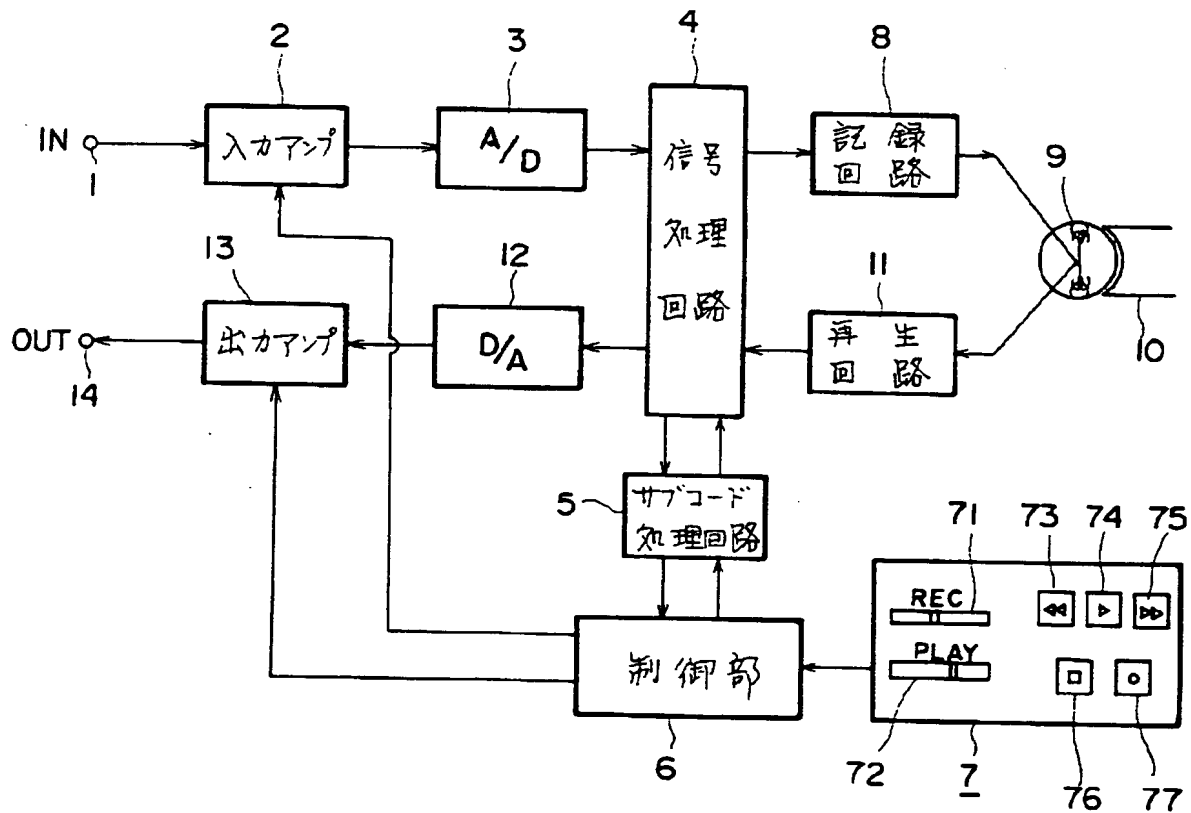
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* 【図2】 図1に示した実施例におけるサブコード信号のフォーマットを示した図である。

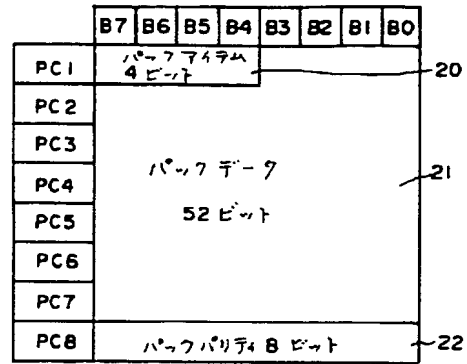
【符号の説明】

- 1 入力端子
- 2 入力アンプ（入力レベル調整回路）
- 3 A/D変換器
- 4 信号処理回路
- 5 サブコード処理回路
- 6 制御部
- 7 キー入力部
- 8 記録回路
- 9 回転ヘッド
- 10 磁気テープ（記録媒体）
- 11 再生回路
- 12 D/A変換器
- 13 出力アンプ（出力レベル調整回路）
- 14 出力端子

【図1】



【図2】



【考案の詳細な説明】

【0001】

【産業上の利用分野】

本考案は、例えばR-DAT（回転ヘッド型デジタル・オーディオ・テープレコーダ）等に用いて好適な記録再生レベル制御装置に関するものである。

【0002】

【従来の技術】

R-DAT或いはアナログオーディオテープレコーダ等を含む音声信号等の記録再生装置においては、一般に入力レベル調整回路を具備している。そして音声信号等の記録時（録音時）には予め録音するソースの入力レベルを調べて、前記入力レベル調整回路によって入力信号が歪まない限度で、なるべく録音レベルを上げて録音するようにしている。

【0003】

しかしながら録音時において、前記入力レベル調整回路によって入力レベルを合わせる際、入力レベルが最も高い部分を探すのは容易ではない。現実には録音開始後しばらくして再度録音レベルを調整し直し、記録媒体である磁気テープを巻き戻して、再度録音をし直すことも度々経験するところである。

【0004】

【考案が解決しようとする課題】

ところで、録音しようとするソースが再度得られる場合には、前記したような操作をし直す事も可能であるが、例えば録音しようとするソースが放送音楽番組等のような場合には、再度頭から録音し直すことは最早不可能である。従って最大録音レベルをオーバーし、歪みの多い状態で録音したり、または過少に録音レベルを絞り、S/Nが低下した状態で録音せざるを得ないという状態が発生する。

【0005】

また、前記したような状況を避けるために録音開始後、録音中に再度録音レベルを調整し直した場合には、再生時において録音レベルを調整し直した部分より再生レベルが変化するという問題点が生ずる。

【0006】

本考案は前記したような点に鑑みて成されたものであり、録音開始後において、録音レベルを調整し直した場合においても、再生時における再生レベルが変化することのない記録再生レベル制御装置を提供することを課題としている。

【0007】

【課題を解決するための手段】

前記課題を達成するために成された本考案の記録再生レベル制御装置は、例えば入力音声信号のレベルを調整する入力アンプ2と、入力アンプ2によって調整された音声信号と、入力アンプ2によって調整した入力レベルに関するレベル情報とを同一の磁気テープ10に対して記録する記録回路8と、磁気テープ10に記録された音声信号とレベル情報とを読み出して所定レベルに増幅する再生回路11と、再生回路11によってもたらされる音声信号を再生回路11によってもたらされるレベル情報によってレベル調整する出力アンプ13とを具備した点に特徴を有する。

【0008】

【作用】

前記構成の記録再生レベル制御装置においては、入力アンプ2によって調整された音声信号と、入力アンプ2によって調整した入力レベルに関するレベル情報とが記録回路8によって同一の磁気テープ10に対して記録される。また再生時においては、再生回路11によってもたらされる音声信号を、同じく再生回路11によってもたらされるレベル情報によってレベル調整するよう成される。

【0009】

このために、録音開始後においてたとえ録音レベルを調整し直した場合においても、再生時における再生レベルは前記レベル情報によって調整され、再生レベルが途中で変化することのない再生出力を得ることが可能となる。

【0010】

【実施例】

以下、本考案を図に示す実施例に基づいて説明する。図1はR-DATを例にした本考案の記録再生レベル制御装置の一例をブロック図で示したものである。

【0011】

図1において、1は音声信号の入力端子を示しており、この入力端子1に供給された入力信号は入力アンプ2に供給される。この入力アンプ2は、後述する制御部からのレベル制御信号を受けて入力信号をレベルを調整する入力レベル調整回路を構成しており、この入力アンプ2によってレベル調整された入力信号はA/D変換器3に供給されてデジタル信号に変換される。

【0012】

前記A/D変換器3によってデジタル信号に変換された入力信号は、信号処理回路4に供給される。この信号処理回路4には、サブコード処理回路5が接続されており、このサブコード処理回路5には、さらにマイクロコンピュータより成る制御部6が接続されている。前記制御部6には各種の動作モードを指示するキー入力部7が接続されており、このキー入力部7には、音声信号の記録時のレベルを調整する入力レベル調整ボリューム71、再生時における再生音声信号の出力レベルを調整する出力レベル調整ボリューム72、機器の巻き戻しモードを選択するREW釦73、再生モードを選択するPLAY釦74、早送りモードを選択するFF釦75、停止を選択するSTOP釦76、および録音モードを指示するREC釦77等が配置されている。

【0013】

そして、前記制御部6からは前記入力アンプ2に対してレベル制御信号が供給され、前記キー入力部7における入力レベル調整ボリューム71によって調整された値に応じ、入力端子1に供給された入力信号のレベルが調整される。また前記キー入力部7における入力レベル調整ボリューム71によって得られる入力レベルに関するレベル情報は、制御部6を介して前記サブコード処理回路5に供給される。サブコード処理回路5はキー入力部7の入力レベル調整ボリューム71によって調整されたレベル情報をコード化し、前記信号処理回路4に伝達する。

【0014】

信号処理回路4は、前記A/D変換器3によってデジタル変換された入力信号情報と、前記サブコード処理回路5からのレベル情報とを多重化して記録回路8に送出する。記録回路8は前記多重化信号を受けて電力増幅し、これを回転ヘッド9に対して供給し、回転ヘッド9はこの回転ヘッド9に摺接した記録媒体であ

る磁気テープ10に対して前記多重化信号を記録する。

【0015】

一方、前記磁気テープ10に記録された多重化信号は、回転ヘッド9によって読み出され、再生回路11によって所定レベルに増幅される。そして信号処理回路4に供給されて信号情報とレベル情報とに分離される。前者の信号情報はD/A変換器12に供給されてアナログ音声信号に変換され、出力レベル調整回路を構成する出力アンプ13に供給される。後者のサブコード信号中のレベル情報は、サブコード処理回路5に供給されて記録時のレベルに対応した情報に復調されて制御部6にもたらされる。

【0016】

前記制御部6は、前記キー入力部7における出力レベル調整ボリューム72からのレベル制御情報に前記サブコード処理回路5からの記録時のレベルに対応した情報を加算したレベル制御信号を、出力アンプ13に対して供給する。このためにD/A変換器13によって変換されたアナログ音声信号は、前記レベル制御信号によってレベル制御され、出力端子14にもたらされる。

【0017】

図2は、R-DATにおけるサブコードブロック内のデータフォーマットを示したものである。すなわちR-DATは、磁気テープのサブデータエリアに主に位置情報として利用されるサブコードが記録される。このサブコードは音声のPCMの両外側に8ブロックずつ記録され、各ブロックは288ビットからなり、8ビットのSYNC、16ビットのヘッダ部、8ビットのパリティ、および256ビットのサブコードデータで構成されている。前記サブコードデータは図2に示すように64ビット単位でパックが構成され、4ビットのアイテム部20と、52ビットのデータ部21と、8ビットのパリティ22をもっている。

【0018】

本考案においては、図2に示す52ビットのパックデータ部21を利用して記録時において、前記入力レベル調整回路すなわち入力アンプ2によって調整した入力レベルに関するレベル情報をデジタル信号として記録する。この場合、記録開始時のレベル設定値を基準として、記録開始後にキー入力部7における入力レ

ベル調整ボリューム71を手動にて操作した場合、そのボリューム変化量を“+”または“-”値として差値を記録する。

【0019】

再生時においては、サブコード処理回路5により、前記記録開始後のボリューム変化量に対応する差値データが再生され、これが制御部6に供給される。前記制御部6は、前記キー入力部7における出力レベル調整ボリューム72からのレベル制御情報に、前記サブコード処理回路5からの差値情報を加算したレベル制御信号を出力アンプ13に対して供給する。

【0020】

例えば、-10dBで記録開始後に入力レベル調整ボリューム71を操作して、録音レベルを例えば-5dB変化させたとすれば、この時録音レベルは+5dBされて磁気テープ10に対して記録されることになる。そして再生時に出力レベル調整ボリューム72によって出力レベルが調整され、例えば-10dBで再生したとすると、録音レベルを-5dBに変化させた部分(5dBだけ増加させた部分)にテープの再生位置が到来した場合には、再生レベルを5dBだけ低下させるべく、制御部6より出力アンプ13に制御信号が供給される。従って、結局のところ出力端子14にもたらされる再生出力レベルは-10dBの一定のままととなる。

【0021】

なお、以上は本考案をR-DATに適用した場合に基づいて説明したが、本考案は例えばアナログオーディオテープレコードに採用することもできる。すなわち、録音開始後の入力レベル調整ボリュームの手動操作量に応じた情報を可聴帯域以下の低周波信号として記録信号に重畳させて記録し、再生時においてこの低周波信号に基づいて出力レベルを可変させることで、前記実施例に示したと同様な作用効果を得ることができる。

【0022】

【考案の効果】

以上のように、本考案の記録再生レベル制御装置によれば、入力レベル調整回路すなわち入力アンプによって調整された入力信号と入力アンプによって調整し

た入力レベルに関するレベル情報とが記録回路によって同一の記録媒体すなわち磁気テープに対して記録される。また再生時においては、出力レベル調整回路すなわち出力アンプにおいて、磁気テープより読み出された再生信号情報を、同じく磁気テープより読み出されたレベル情報によってレベル調整するよう成される。

【0023】

このために、録音開始後においてたとえ録音レベルを調整し直した場合においても、再生時における再生レベルは、前記レベル情報によって調整され、再生レベルが途中で変化することのない再生出力を得ることが可能となる。

従って録音時のレベル調整は比較的安易に行うことができ、録音開始後において録音レベルが不適性であると判明した際、入力レベル調整ボリュームを操作することで歪みの少ない、且つS/Nの良好な記録再生が達成できる。

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CLAIMS

[Utility model registration claim]

[Claim 1] The record circuit which records the level information about the input level adjusted by the input-level equalization circuit which adjusts the level of an input signal, and the signal adjusted by said input-level equalization circuit and said input-level equalization circuit to the same record medium, The regenerative circuit which reads the signal and level information which were recorded on said record medium, and is amplified on predetermined level, The record regeneration level control unit which possesses the output-level equalization circuit which carries out level adjustment, and changes using the level information to which the signal brought about by said regenerative circuit is brought by said regenerative circuit.

[Translation done.]

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DETAILED DESCRIPTION

[Detailed explanation of a design]

[0001]

[Industrial Application]

This design is used for R-DAT (rotary head mold digital audiotape recorder) etc., and is related with a suitable record regeneration level control unit.

[0002]

[Description of the Prior Art]

Generally in record regenerative apparatus, such as a sound signal containing R-DAT or an analog audio tape recorder, the input-level equalization circuit is provided. And the input level of the source recorded beforehand is investigated at the time of record of a sound signal etc. (at the time of sound recording), and, if possible, he raises a recording level in the limit where an input signal is not distorted by said input-level equalization circuit, and is trying to record.

[0003]

However, in case an input level is doubled by said input-level equalization circuit at the time of sound recording, it is not easy for an input level to look for the highest part. It is also just going to experience frequently to readjust a recording level again after a while after sound recording initiation actually, to rewind the magnetic tape which is a record medium, and to do sound recording again again.

[0004]

[Problem(s) to be Solved by the Device]

By the way, when the source which it is going to record is obtained again, it is also possible to do again actuation which was described above, but when like [the source which it is going to record, for example / a broadcast music program etc.], rerecording flatly again is already impossible. Therefore, the maximum recording level is exceeded, it records in the condition with much distortion, or a recording level is extracted too little, and the condition of saying that it cannot but record in the condition that S/N fell occurs.

[0005]

Moreover, in order to avoid a situation which was described above, when the sound recording initiation back is adjusted, and a recording level is again readjusted during sound recording, the trouble that a regeneration level changes from the part which readjusted the recording level at the time of playback arises.

[0006]

It is making into the technical problem to accomplish this design in view of a point which was described above, to also set it, when a recording level is readjusted after sound recording initiation, and to offer the record regeneration level control unit from which the regeneration level at the time of playback does not change.

[0007]

[Means for Solving the Problem]

The record regeneration level control unit of this design accomplished in order to attain said technical problem For example, the input amplifier 2 which adjusts the level of an input sound signal and the sound signal adjusted with the input amplifier 2, The record circuit 8 which records

the level information about the input level adjusted with the input amplifier 2 to the same magnetic tape 10, The regenerative circuit 11 which reads the sound signal and level information which were recorded on the magnetic tape 10, and is amplified on predetermined level, It has the description at the point of having provided the output amplifier 13 which carries out level adjustment using the level information to which the sound signal brought about by the regenerative circuit 11 is brought by the regenerative circuit 11.

[0008]

[Function]

In the record regeneration level control unit of said configuration, the sound signal adjusted with the input amplifier 2 and the level information about the input level adjusted with the input amplifier 2 are recorded by the record circuit 8 to the same magnetic tape 10. Moreover, it accomplishes so that level adjustment may be carried out using the level information to which the sound signal brought about by the regenerative circuit 11 at the time of playback is similarly brought by the regenerative circuit 11.

[0009]

For this reason, it also sets, when a recording level is readjusted even if after sound recording initiation, and the regeneration level at the time of playback is adjusted by said level information, and a regeneration level becomes possible [obtaining the playback output which does not change on the way].

[0010]

[Example]

Hereafter, this design is explained based on the example shown in drawing. Drawing 1 shows an example of the record regeneration level control device of this design which made R-DAT the example with a block diagram.

[0011]

In drawing 1 , 1 shows the input terminal of a sound signal and the input signal supplied to this input terminal 1 is supplied to the input amplifier 2. This input amplifier 2 constitutes the input-level equalization circuit which adjusts level for an input signal in response to the level control signal from a control section mentioned later, and the input signal by which level adjustment was carried out with this input amplifier 2 is supplied to A/D converter 3, and is changed into a digital signal.

[0012]

The input signal changed into the digital signal by said A/D converter 3 is supplied to a digital disposal circuit 4. The sub-code processing circuit 5 is connected to this digital disposal circuit 4, and the control section 6 which consists of a microcomputer further is connected to this sub-code processing circuit 5. The key input section 7 which directs various kinds of modes of operation is connected to said control section 6. In this key input section 7 The level at the time of record of a sound signal The input-level adjustment volume 71 to adjust, the output-level adjustment volume 72 which adjusts the output level of the playback sound signal at the time of playback, REW ** 73 which chooses the rewinding mode of a device, PLAY ** 74 which chooses a playback mode, and rapid-traverse mode FF ** 75 to choose, STOP ** 76 which chooses a halt, and REC ** which directs sound recording mode 77 grade are arranged.

[0013]

And from said control section 6, a level control signal is supplied to said input amplifier 2, and the level of the input signal supplied to the input terminal 1 is adjusted according to the value adjusted by the input-level adjustment volume 71 in said key input section 7. Moreover, the level information about the input level obtained by the input-level adjustment volume 71 in said key input section 7 is supplied to said sub-code processing circuit 5 through a control section 6. The sub-code processing circuit 5 codes the level information adjusted by the input-level adjustment volume 71 of the key input section 7, and transmits it to said digital disposal circuit 4.

[0014]

A digital disposal circuit 4 is the input signal by which digital conversion was carried out with said A/D converter 3.

Information and the level information from said sub-code processing circuit 5 are multiplexed,

and it sends out to a record circuit 8. In response to said multiplexed signal, power amplification of the record circuit 8 is carried out, this is supplied to a rotary head 9, and a rotary head 9 records said multiplexed signal to the magnetic tape 10 which is the record medium which ****ed to this rotary head 9.

[0015]

On the other hand, the multiplexed signal recorded on said magnetic tape 10 is read by the rotary head 9, and is amplified by the regenerative circuit 11 at predetermined level. And a digital disposal circuit 4 is supplied and it separates into signaling information and level information. The former signaling information is supplied to D/A converter 12, is changed into an analog sound signal and supplied to the output amplifier 13 which constitutes an output-level equalization circuit. The sub-code processing circuit 5 is supplied, it gets over to the information corresponding to the level at the time of record, and the level information in the latter sub-code signal is brought to a control section 6.

[0016]

Said control section 6 supplies the level control signal which added the information corresponding to the level at the time of the record from said sub-code processing circuit 5 to level control information from the output-level adjustment volume 72 in said key input section 7 to the output amplifier 13. For this reason, by said level control signal, the level control of the analog sound signal changed by D/A converter 13 is carried out, and it is brought to an output terminal 14.

[0017]

Drawing 2 shows the data format within the sub-code block in R-DAT. That is, the sub-code by which R-DAT is mainly used for the subdata area of a magnetic tape as positional information is recorded. 8 blocks of this sub-code are recorded at a time on both the outsides of audio PCM, and each block consists of 288 bits and consists of 8 bits SYNC, a 16 bits header unit, 8 bits parity, and 256-bit sub-code data. As shown in drawing 2, a pack consists of 64 bitwises, and said sub-code data have the 4 bits item section 20, the 52 bits data division 21, and the 8-bit parity 22.

[0018]

In this design, the level information about the input level adjusted by said input-level equalization circuit 2, i.e., input amplifier, using the 52-bit packed-data section 21 shown in drawing 2 at the time of record is recorded as a digital signal. In this case, when the input-level adjustment volume 71 in the key input section 7 is manually operated after a recording start on the basis of the level-setting value at the time of a recording start, a difference value is recorded by making that volume variation into "+" or the "-" value.

[0019]

In the time of playback, the difference value data corresponding to the volume variation after said recording start are reproduced by the sub-code processing circuit 5, and this is supplied to a control section 6. Said control section 6 supplies the level control signal which added the difference value information from said sub-code processing circuit 5 to level control information from the output-level adjustment volume 72 in said key input section 7 to the output amplifier 13.

[0020]

For example, if the input-level adjustment volume 71 was operated after the recording start by -10dB and -5dB of recording levels was changed, for example, at this time, +5dB of recording levels will be carried out, and they will be recorded to a magnetic tape 10. And supposing an output level is adjusted by the output-level adjustment volume 72 at the time of playback, for example, it reproduces by -10dB, when the playback location of a tape arrives at the part (part to which it was made to increase only 5dB) which changed the recording level to -5dB, a control signal is supplied to the output amplifier 13 from a control section 6 in order to reduce a regeneration level only by 5dB. Therefore, the playback output level brought to an output terminal 14 despite a join office becomes fixed with -10dB as.

[0021]

In addition, although the above explained this design based on the case where it applies to R-

DAT, this design is also employable as for example, an analog audio tape recorder. That is, the information according to the amount of manual operation of the input-level adjustment volume after sound recording initiation can be made to be able to superimpose on a record signal as a low frequency signal below an audible band, it can record, and the same operation effectiveness can be acquired with having been shown in said example by carrying out adjustable [of the output level] based on this low frequency signal at the time of playback.

[0022]

[Effect of the Device]

As mentioned above, according to the record regeneration level control device of this design, the input signal adjusted by the input-level equalization circuit, i.e., input amplifier, and the level information about the input level adjusted with input amplifier are recorded by the record circuit to the same record medium, i.e., magnetic tape. Moreover, in the time of playback, in an output-level equalization circuit, i.e., output amplifier, it accomplishes so that level adjustment of the regenerative-signal information read from the magnetic tape may be carried out using the level information similarly read from the magnetic tape.

[0023]

For this reason, it also sets, when a recording level is readjusted even if after sound recording initiation, and the regeneration level at the time of playback is adjusted by said level information, and becomes possible [obtaining the playback output from which a regeneration level does not change on the way].

Therefore, level adjustment at the time of sound recording can be performed comparatively easily, and when it becomes clear after sound recording initiation that a recording level is unsuitable nature, good record playback of S/N can be attained by operating input-level adjustment volume that there is little distortion.

[Translation done.]

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TECHNICAL FIELD

[Industrial Application]

This design is used for R-DAT (rotary head mold digital audiotape recorder) etc., and is related with a suitable record regeneration level control unit.

[0002]

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PRIOR ART

[Description of the Prior Art]

Generally in record regenerative apparatus, such as a sound signal containing R-DAT or an analog audio tape recorder, the input-level equalization circuit is provided. And the input level of the source recorded beforehand is investigated at the time of record of a sound signal etc. (at the time of sound recording), and, if possible, he raises a recording level in the limit where an input signal is not distorted by said input-level equalization circuit, and is trying to record.

[0003]

However, in case an input level is doubled by said input-level equalization circuit at the time of sound recording, it is not easy for an input level to look for the highest part. It is also just going to experience frequently to readjust a recording level again after a while after sound recording initiation actually, to rewind the magnetic tape which is a record medium, and to do sound recording again again.

[0004]

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EFFECT OF THE INVENTION

[Effect of the Device]

As mentioned above, according to the record regeneration level control device of this design, the input signal adjusted by the input-level equalization circuit, i.e., input amplifier, and the level information about the input level adjusted with input amplifier are recorded by the record circuit to the same record medium, i.e., magnetic tape. Moreover, in the time of playback, in an output-level equalization circuit, i.e., output amplifier, it accomplishes so that level adjustment of the regenerative-signal information read from the magnetic tape may be carried out using the level information similarly read from the magnetic tape.

[0023]

For this reason, it also sets, when a recording level is readjusted even if after sound recording initiation, and the regeneration level at the time of playback is adjusted by said level information, and becomes possible [obtaining the playback output from which a regeneration level does not change on the way].

Therefore, level adjustment at the time of sound recording can be performed comparatively easily, and when it becomes clear after sound recording initiation that a recording level is unsuitable nature, good record playback of S/N can be attained by operating input-level adjustment volume that there is little distortion.

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TECHNICAL PROBLEM

[Problem(s) to be Solved by the Device]

By the way, when the source which it is going to record is obtained again, it is also possible to do again actuation which was described above, but when like [the source which it is going to record, for example / a broadcast music program etc.], rerecording flatly again is already impossible. Therefore, the maximum recording level is exceeded, it records in the condition with much distortion, or a recording level is extracted too little, and the condition of saying that it cannot but record in the condition that S/N fell occurs.

[0005]

Moreover, in order to avoid a situation which was described above, when the sound recording initiation back is adjusted, and a recording level is again readjusted during sound recording, the trouble that a regeneration level changes from the part which readjusted the recording level at the time of playback arises.

[0006]

It is making into the technical problem to accomplish this design in view of a point which was described above, to also set it, when a recording level is readjusted after sound recording initiation, and to offer the record regeneration level control unit from which the regeneration level at the time of playback does not change.

[0007]

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MEANS

[Means for Solving the Problem]

The record regeneration level control unit of this design accomplished in order to attain said technical problem For example, the input amplifier 2 which adjusts the level of an input sound signal and the sound signal adjusted with the input amplifier 2, The record circuit 8 which records the level information about the input level adjusted with the input amplifier 2 to the same magnetic tape 10, The regenerative circuit 11 which reads the sound signal and level information which were recorded on the magnetic tape 10, and is amplified on predetermined level, It has the description at the point of having provided the output amplifier 13 which carries out level adjustment using the level information to which the sound signal brought about by the regenerative circuit 11 is brought by the regenerative circuit 11.

[0008]

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OPERATION

[Function]

In the record regeneration level control unit of said configuration, the sound signal adjusted with the input amplifier 2 and the level information about the input level adjusted with the input amplifier 2 are recorded by the record circuit 8 to the same magnetic tape 10. Moreover, it accomplishes so that level adjustment may be carried out using the level information to which the sound signal brought about by the regenerative circuit 11 at the time of playback is similarly brought by the regenerative circuit 11.

[0009]

For this reason, it also sets, when a recording level is readjusted even if after sound recording initiation, and the regeneration level at the time of playback is adjusted by said level information, and a regeneration level becomes possible [obtaining the playback output which does not change on the way].

[0010]

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EXAMPLE

[Example]

Hereafter, this design is explained based on the example shown in drawing. Drawing 1 shows an example of the record regeneration level control device of this design which made R-DAT the example with a block diagram.

[0011]

In drawing 1 , 1 shows the input terminal of a sound signal and the input signal supplied to this input terminal 1 is supplied to the input amplifier 2. This input amplifier 2 constitutes the input-level equalization circuit which adjusts level for an input signal in response to the level control signal from a control section mentioned later, and the input signal by which level adjustment was carried out with this input amplifier 2 is supplied to A/D converter 3, and is changed into a digital signal.

[0012]

The input signal changed into the digital signal by said A/D converter 3 is supplied to a digital disposal circuit 4. The sub-code processing circuit 5 is connected to this digital disposal circuit 4, and the control section 6 which consists of a microcomputer further is connected to this sub-code processing circuit 5. The key input section 7 which directs various kinds of modes of operation is connected to said control section 6. In this key input section 7 The level at the time of record of a sound signal The input-level adjustment volume 71 to adjust, the output-level adjustment volume 72 which adjusts the output level of the playback sound signal at the time of playback, REW ** 73 which chooses the rewinding mode of a device, PLAY ** 74 which chooses a playback mode, and rapid-traverse mode FF ** 75 to choose, STOP ** 76 which chooses a halt, and REC ** which directs sound recording mode 77 grade are arranged.

[0013]

And from said control section 6, a level control signal is supplied to said input amplifier 2, and the level of the input signal supplied to the input terminal 1 is adjusted according to the value adjusted by the input-level adjustment volume 71 in said key input section 7. Moreover, the level information about the input level obtained by the input-level adjustment volume 71 in said key input section 7 is supplied to said sub-code processing circuit 5 through a control section 6. The sub-code processing circuit 5 codes the level information adjusted by the input-level adjustment volume 71 of the key input section 7, and transmits it to said digital disposal circuit 4.

[0014]

A digital disposal circuit 4 is the input signal by which digital conversion was carried out with said A/D converter 3.

Information and the level information from said sub-code processing circuit 5 are multiplexed, and it sends out to a record circuit 8. In response to said multiplexed signal, power amplification of the record circuit 8 is carried out, this is supplied to a rotary head 9, and a rotary head 9 records said multiplexed signal to the magnetic tape 10 which is the record medium which ****ed to this rotary head 9.

[0015]

On the other hand, the multiplexed signal recorded on said magnetic tape 10 is read by the rotary head 9, and is amplified by the regenerative circuit 11 at predetermined level. And a digital

disposal circuit 4 is supplied and it separates into signaling information and level information. The former signaling information is supplied to D/A converter 12, is changed into an analog sound signal and supplied to the output amplifier 13 which constitutes an output-level equalization circuit. The sub-code processing circuit 5 is supplied, it gets over to the information corresponding to the level at the time of record, and the level information in the latter sub-code signal is brought to a control section 6.

[0016]

Said control section 6 supplies the level control signal which added the information corresponding to the level at the time of the record from said sub-code processing circuit 5 to level control information from the output-level adjustment volume 72 in said key input section 7 to the output amplifier 13. For this reason, by said level control signal, the level control of the analog sound signal changed by D/A converter 13 is carried out, and it is brought to an output terminal 14.

[0017]

Drawing 2 shows the data format within the sub-code block in R-DAT. That is, the sub-code by which R-DAT is mainly used for the subdata area of a magnetic tape as positional information is recorded. 8 blocks of this sub-code are recorded at a time on both the outsides of audio PCM, and each block consists of 288 bits and consists of 8 bits SYNC, a 16 bits header unit, 8 bits parity, and 256-bit sub-code data. As shown in drawing 2, a pack consists of 64 bitwises, and said sub-code data have the 4 bits item section 20, the 52 bits data division 21, and the 8-bit parity 22.

[0018]

In this design, the level information about the input level adjusted by said input-level equalization circuit 2, i.e., input amplifier, using the 52-bit packed-data section 21 shown in drawing 2 at the time of record is recorded as a digital signal. In this case, when the input-level adjustment volume 71 in the key input section 7 is manually operated after a recording start on the basis of the level-setting value at the time of a recording start, a difference value is recorded by making that volume variation into "+" or the "-" value.

[0019]

In the time of playback, the difference value data corresponding to the volume variation after said recording start are reproduced by the sub-code processing circuit 5, and this is supplied to a control section 6. Said control section 6 supplies the level control signal which added the difference value information from said sub-code processing circuit 5 to level control information from the output-level adjustment volume 72 in said key input section 7 to the output amplifier 13.

[0020]

For example, if the input-level adjustment volume 71 was operated after the recording start by -10dB and -5dB of recording levels was changed, for example, at this time, +5dB of recording levels will be carried out, and they will be recorded to a magnetic tape 10. And supposing an output level is adjusted by the output-level adjustment volume 72 at the time of playback, for example, it reproduces by -10dB, when the playback location of a tape arrives at the part (part to which it was made to increase only 5dB) which changed the recording level to -5dB, a control signal is supplied to the output amplifier 13 from a control section 6 in order to reduce a regeneration level only by 5dB. Therefore, the playback output level brought to an output terminal 14 despite a join office becomes fixed with -10dB as.

[0021]

In addition, although the above explained this design based on the case where it applies to R-DAT, this design is also employable as for example, an analog audio tape recorder. That is, the information according to the amount of manual operation of the input-level adjustment volume after sound recording initiation can be made to be able to superimpose on a record signal as a low frequency signal below an audible band, it can record, and the same operation effectiveness can be acquired with having been shown in said example by carrying out adjustable [of the output level] based on this low frequency signal at the time of playback.

[0022]

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DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]

[Drawing 1] It is the block diagram showing the configuration of one example at the time of applying the record regeneration level control device of this design to R-DAT.

[Drawing 2] It is drawing having shown the format of the sub-code signal in the example shown in drawing 1 .

[Description of Notations]

- 1 Input Terminal
- 2 Input Amplifier (Input-Level Equalization Circuit)
- 3 A/D Converter
- 4 Digital Disposal Circuit
- 5 Sub-code Processing Circuit
- 6 Control Section
- 7 Key Input Section
- 8 Record Circuit
- 9 Rotary Head
- 10 Magnetic Tape (Record Medium)
- 11 Regenerative Circuit
- 12 D/A Converter
- 13 Output Amplifier (Output-Level Equalization Circuit)
- 14 Output Terminal

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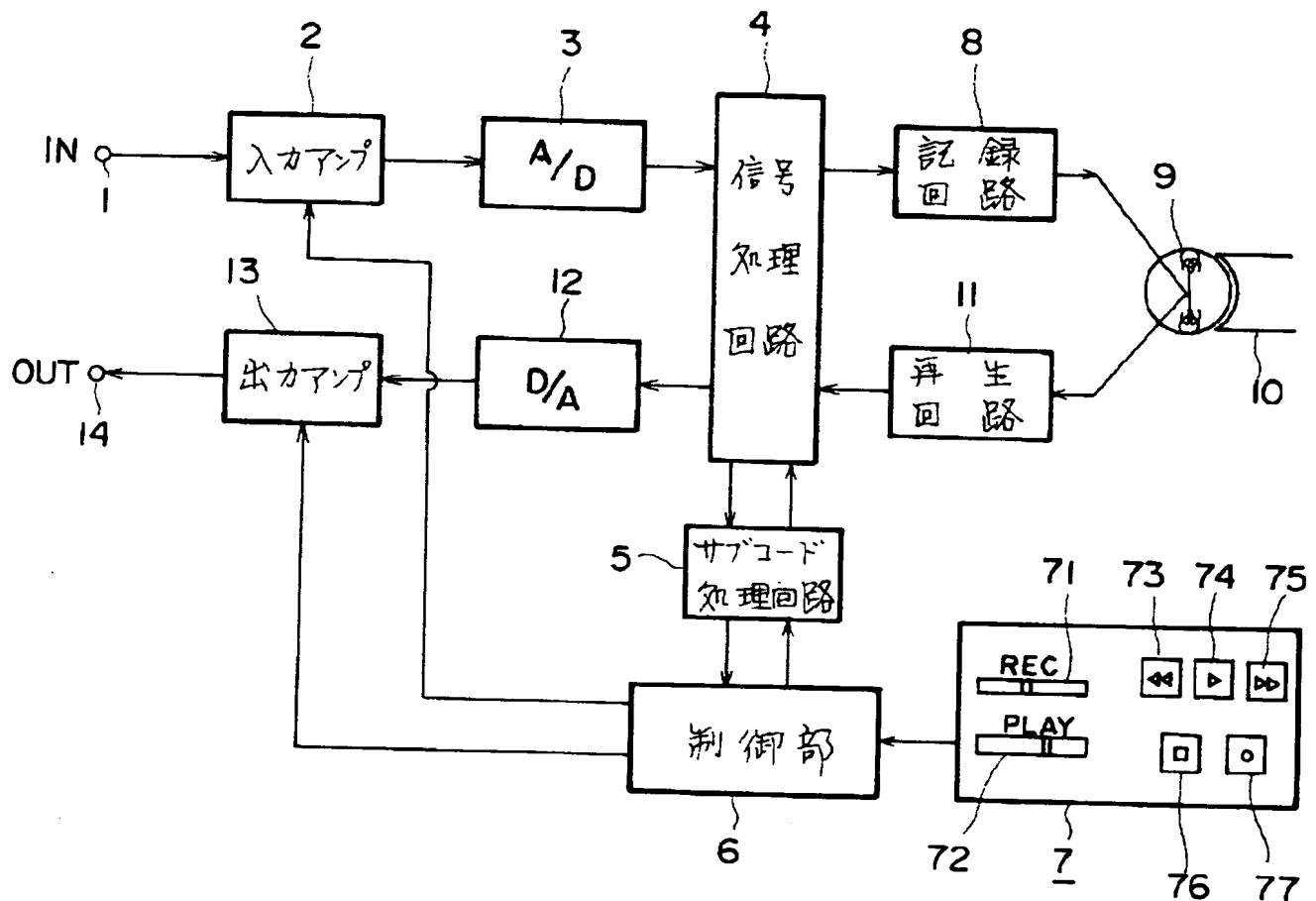
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DRAWINGS

[Drawing 1]



[Drawing 2]

